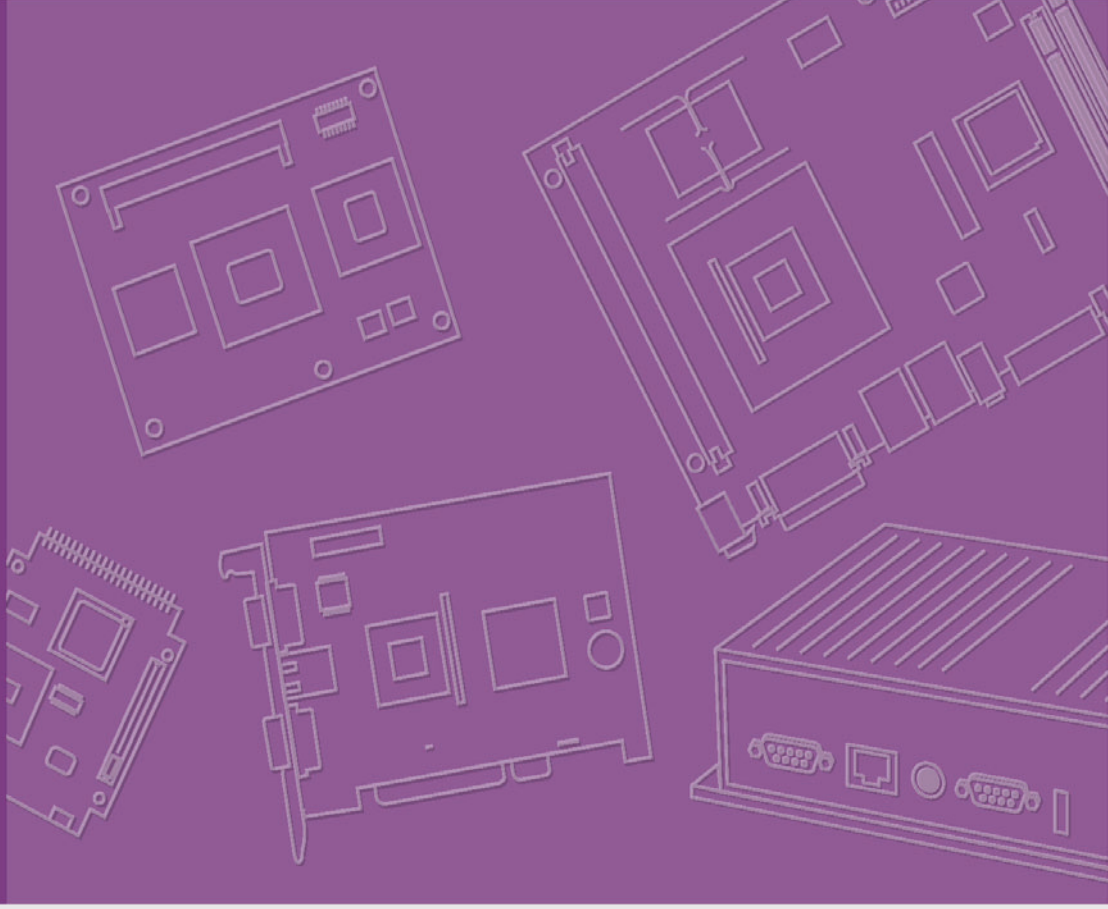

User Manual

SOM-4461 A2 Version

Trusted ePlatform Services

ADVANTECH

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Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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If you think you have a defective product, follow these steps:

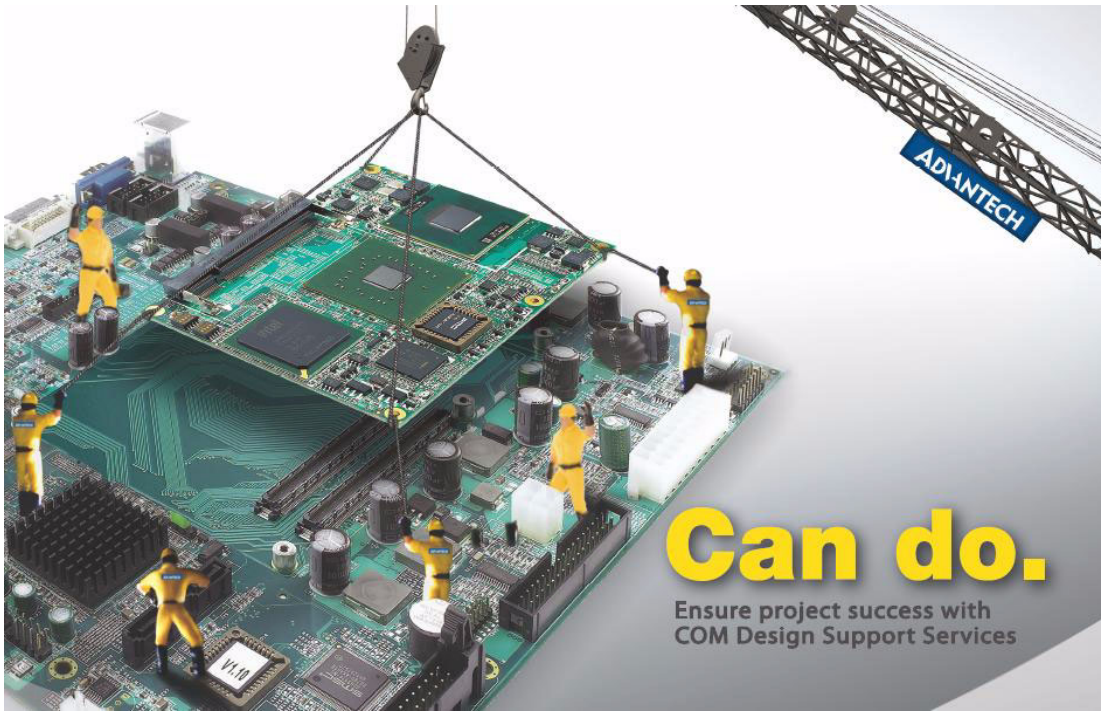
1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

COM Design Support



A Series of Value-Added Services for Carrier Board Development

Advantech COM Design Support Services help customers to reduce the time and work involved with designing new carrier boards. We handle the complexities of technical research and greatly minimize the development risk associated with carrier boards.

COM Product & Support Services

- Full Range of COM Product Offerings
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Design Assistance Services

- Schematic Review
- Placement and Layout Review
- Debugging Assistance Services
- General/Special Reference Design Database

Thermal Solution Services

- Standard Thermal Solutions
- Customized Thermal Solutions

Embedded Software Services

- Embedded OS
- BIOS Customization
- Application Library: SUSI (Secure and Unified Smart Interface)

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COM Product & Support Services

Advantech provides a full range of Computer on Modules including COM-Express, ETX, XTX and COM-Micro to fulfill diverse customer applications. Advantech also serves comprehensive document support to clients for project development.

Design Assistance Services

The Design Assistance Service is created to offer essential help to complete crucial development tasks: schematic review, placement review, debugging and a general/special database of technologies for reference purposes. All services reduce design risks associated with completing customer carrier boards.

Thermal Solution Services

In order to provide quicker and more flexible solutions for customer's thermal designs. Advantech provides thermal solution services including modularized thermal solutions and customized thermal solutions.

Embedded Software Services

Advantech provides Embedded Software Services to customers who integrate Advantech hardware products. Advantech Embedded Software Services include Embedded BIOS services, OS services and API Library (SUSI), Embedded Software Services help decrease design effort and project complexity, and accelerate product development.

COM Design Support Zone: http://com.advantech.com/

Advantech reserves the right to determine, on a case by case basis, whether or not COM Design Support Services are appropriate.

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For more information about this and other Advantech products, please visit our website at:

<http://www.advantech.com/>

<http://www.advantech.com/ePlatform/>

For technical support and service, please visit our support website at:

<http://support.advantech.com.tw/support/>

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Packing List

Before installation, please ensure the following items have been shipped:

- 1 SOM-4461 CPU module
- 1 Utility CD (Including manual and driver)
- 1 heatspreader 114*95*3mm

Optional Accessories

Part No.	Description
1960012091T00S	Semi-Heatsink 114 x 96 x 15 mm

Development board

Part No.	Description
SOM-DB4400-00A2E	Development Board for ETX Rev.A2
SOM-DB4700-00A1E	Development Board for ETX Rev.A1

For more information please refer to "Advantech Baseboard Check List" and "Evaluation Board Reference Schematic".

You can download "Advantech Baseboard Check List" and "Evaluation Board Reference Schematic" from http://com.advantech.com/

Ordering information

Model Number Description

Part No.	SOM-4461FL-S6A1E	SOM-4461RL-S6A2E
CPU	ATOM N270 1.6 GHz	ATOM N270 1.6 GHz
L2 Cache	512 KB L2	512 KB L2
Chipset	945GSE	945GSE
LVDS	36-bit	36/48-bit
VGA	Yes	Yes
SDVO	1	0
TV out	Yes	Yes
10/100 LAN	Yes	Yes
AC97 Audio	Yes	Yes
PCI	4	4
USB 2.0	4	4
SATA	2	2
LPT/Floppy	Note 1	Note 1
KB/MS	Yes	Yes
ATX Power	Yes	Yes
AT Power	Yes	Yes
Thermal Solution	Passive	Passive
Operation Temp.	0 ~ 60° C	0 ~ 60° C

Note! *Select Parallel function and floppy via BIOS selection. Default mode is Parallel mode.*

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Chapter 1

General Introduction

This chapter gives background information on the SOM-4461.

Sections include:

- Introduction
- Specifications

1.1 Introduction

SOM-4461 is an embedded ETX 3.0 CPU module. The new CPU module supports Intel® N270 1.6 GHz processor with Intel® 945GSE and ICH7M chipsets. SOM-4461 has an integrated graphic engine: Intel® GMA950 and Microsoft® DirectX 9.1. In a basic form factor of 114 mm x 95 mm, SOM-4461 provides scalable high performance with lower power consumption, and is an easy to integrate solution for applications utilizing a plug-in CPU module on an application-specific customer solution board.

SOM-4461 with advanced I/O capacity incorporates serial differential signaling technologies such as 36/48-bit LVDS, VGA,TV out, AC97 audio, 10/100 LAN, PCI Masters x 4, SATA x 2 ports, USB 2.0 x 4 ports, 1 EIDE, 2 serial ports, FDD/LPT port. SOM-4461 offers design partners more choices for their own applications needing lower power consumption while maintaining a compact form factor.

SOM-4461 complies with the "Green Function" standard and supports Idle, Standby and Suspend modes. The small size (114 mm x 95 mm) and use of four high capacity connectors based on the proven ETX 3.0 form factor, allows the CPU module to be easily and securely mounted onto a customized solution board or our standard SOM-DB4400/DB4700 development board.

The SOM-4461 is a highly integrated multimedia COM that combines audio, video, and network functions. It provides dual channel 18/24-bit LVDS interface for small/middle size TFT LCD displays, DDR2 memory up to 2 GB, audio interface (AC97). Major on-board devices adopt PCI technology, to achieve computing performance when customer adopts SOM-4461 to establish their own application.

In order to comply with increasing demand for 36/48-bit panel from our customers world wide, we decided to refine our outstanding SOM-4461 and generated an SOM-4461 A2 version, which provides 36/48-bit LVDS interface and Realtek 8103EL LAN support. Customers can now enjoy the benefits already in A1 version and renewed functions in A2 version.

1.2 Product Features

Table 1.1: Product features of SOM-4461 A2 Version		
Features		
Features		Embedded Intel ATOM N270 1.6 GHz processor with low power consumption
		Intel Atom N270+ 945GSE+ ICH7M
		Supports one DDR2 SODIMM up to 2 GB
		Intel GMA950, Microsoft DirectX* 9.1
		Supports multiple displays: VGA, LVDS, TV out
		Realtek 10/100 Mbps LAN
		Expansion: 4 PCI masters, ISA
		4 x USB 2.0, 2 x SATA on board, 1 EIDE, 2 COMs, FDD/ LPT port
Specifications		
Form Factor		ETX 3.0
Processor System	**CPU**	Embedded Intel ATOM N270 1.6 GHz processor
	Front Side Bus	533 MHz FSB
	System Chipset	Intel 945GSE/ ICH7M
	BIOS	AWARD 8 Mbit Flash BIOS
Memory	**Technology**	DDR2 400/533 MHz
	Max. Capacity	up to 2 GB
	Socket	1 x 200-pin SODIMM socket
Display	**Chipset**	Intel 945GSE
	VRAM	DVMT 3.0 Supports up to 224 MB
	Graphic Engine	Intel GMA950, Microsoft DirectX* 9.1
	LVDS	36/48 bit LVDS
	VGA	up to 2048 x 1536
	DVI	N/A
	TV Out	Supports NTSC/PAL, S-Video and Composite Output interfaces
	Dual Display	CRT + LVDS, TV out + LVDS, TV out + CRT
Ethernet	**Chipset**	Realtek 8103EL 10/100Mbps Ethernet
	Speed	10/100Base-T
WatchDog Timer		256 timer intervals, from 1 to 255 seconds or minutes according to software setup, which features jumperless selection and enabling generation of system reset signal
Expansion		4 x PCI masters, ISA,

I/O	**PATA**	1 x EIDE (UDMA 100)
	SATA	2 x SATA (On ETX CPU module)
	USB	4 x USB 2.0
	Audio	Realtek ALC203 AC97 Codec Supports Line-in / out, MIC-in
	GPIO	2-bit GPIO (Support by customized BIOS)
	COM	2 COM ports
	FDD/LPT	1 x FDD or LPT
	SSD	N/A
Power	**Power Type**	ATX, AT
	Power Supply Voltage	+5V only (+5VSB needs for ATX)
	Power Consumption (Typical)	Typical: (1 GB DDRII 533) + 5 V @ 1.15 A
	Power Consumption (Max, test in HCT)	Max: (1 GB DDRII 533) + 5 V @ 1.98 A
Environment	**Operating Temperature**	0 ~ 60 C (32 ~ 140 F)
	Operation Humidity	0% ~ 90% relative humidity, non-condensing
Mechanical	**Dimension**	114 x 95 mm (4.5" x 3.74")

1.3 Mechanical Specifications

1.3.1 Dimensions (mm)

ETX form factor, 114mm(L)*95mm(W)

1.3.2 Height on Top (mm)

Under 6.0mm base on SPEC definition (without heatsink)

1.3.3 Height on Bottom (mm)

Under 2.0mm base on SPEC definition

1.3.4 Heat Spreader Dimensions (mm)

L114mm*W95mm*H3mm (Heat Spreader)

1.3.5 Weight (g) with Heatsink

350 g (weight of total package)

1.4 Electrical Specifications

1.4.1 Power supply Voltage

Voltage requirements:

+5 V only (+5 VSB needs for ATX)

1.4.2 Power supply Current

+V5	HCT 11.2	Burnin Test 5.2	BIOS	Idle	Standby
SOM-4461 Intel Atom N270 1.6GHz with WinXP Sp2 DDR2 1GB Memory	1.98 A	1.97 A	1.48 A	1.15 A (C3 state)	1.28 A

1.5 Environmental Specifications

1.5.1 Operating temperature

Operating temperature: 0 ~ 60° C (32~140°F)

The operating temperature refers to the environmental temperature for the model. Please make sure the heat spreader temperature for SOM-4461 stays under below 60° C.

1.5.2 Operating Humidity

Operating humidity:10% ~ 90% relative humidity, non-condensing

1.5.3 Storage temperature

Storage temperature: -40~85° C

1.5.4 Storage Humidity

Relative humidity: 95% @ 60°C

Chapter 2

H/W installation

This chapter gives mechanical and connector information on the SOM-4461 CPU Computer on Module.

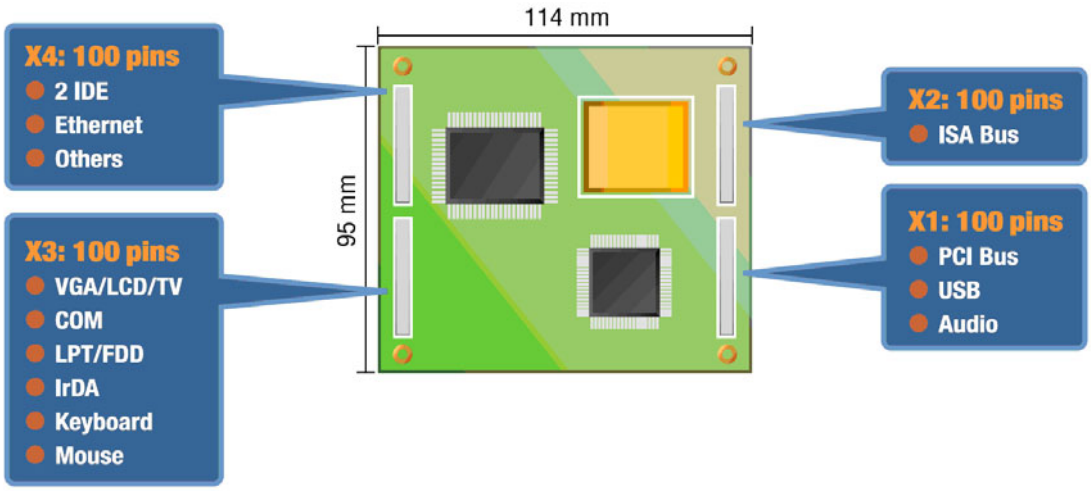
Sections include:

- Connector Information
- Mechanical Drawing

2.1 Connectors

2.1.1 Board Connector

The board has four connectors that allow you to configure your system to suit your application.



Pin Assignments for X1/ X2/ X3/ X4 connectors

Please refer to Advantech_ETX_DesignGuide, Chapter 2.

You can download Advantech_ETX_DesignGuide from http://com.advantech.com/

2.1.2 Connector List

Table 2.1: FAN1 Fan	
FAN1	**Fan**
Part Number	1655303120
Footprint	WF_3P_79_BOX_RA_D
Description	Wafer 2.0mm 3P 90D(M)DIP 2001-WR-03-LF W/Lock
Pin	**Pin Name**
1	Fan Tacho-Input
2	Fan Out
3	GND

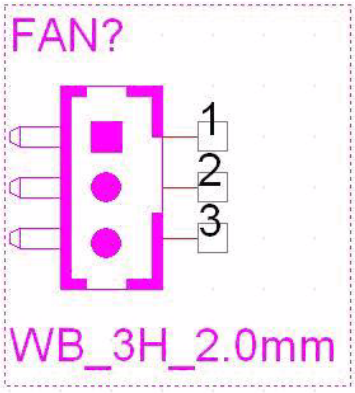


Table 2.2: SATA connector		
Pin	**Pin Name**	**Signal Type**
1	GND	GND
2	SATA0_TX+	I/O
3	SATA0_TX-	I/O
4	GND	GND
5	SATA0_RX-	I/O
6	SATA0_RX+	I/O
7	GND	GND

2.2 Mechanical

2.2.1 Jumper and Connector Locations

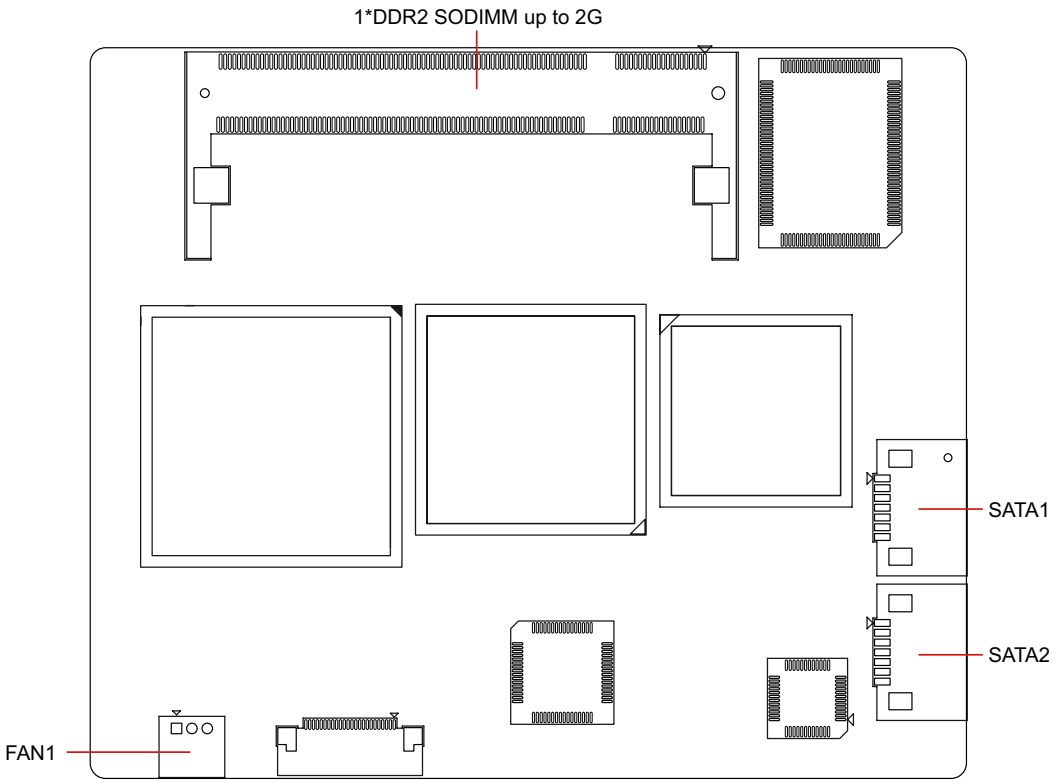


Figure 2.1 Jumper and Connector layout (Component side)

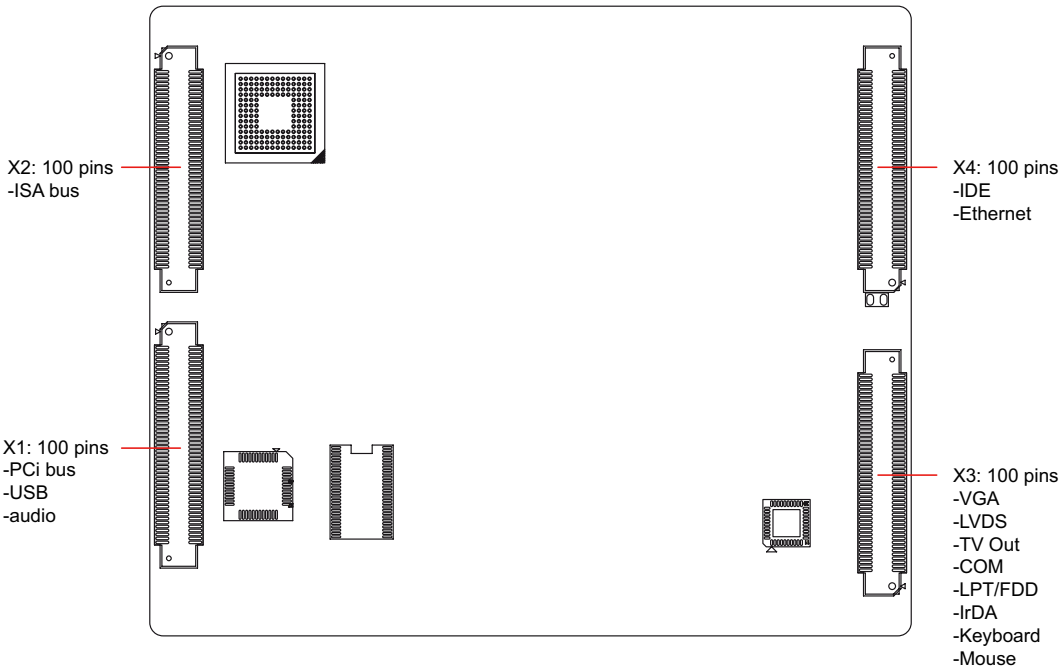


Figure 2.2 Jumper and Connector layout (Solder side)

2.2.2 Board Dimensions (Unit: mm)

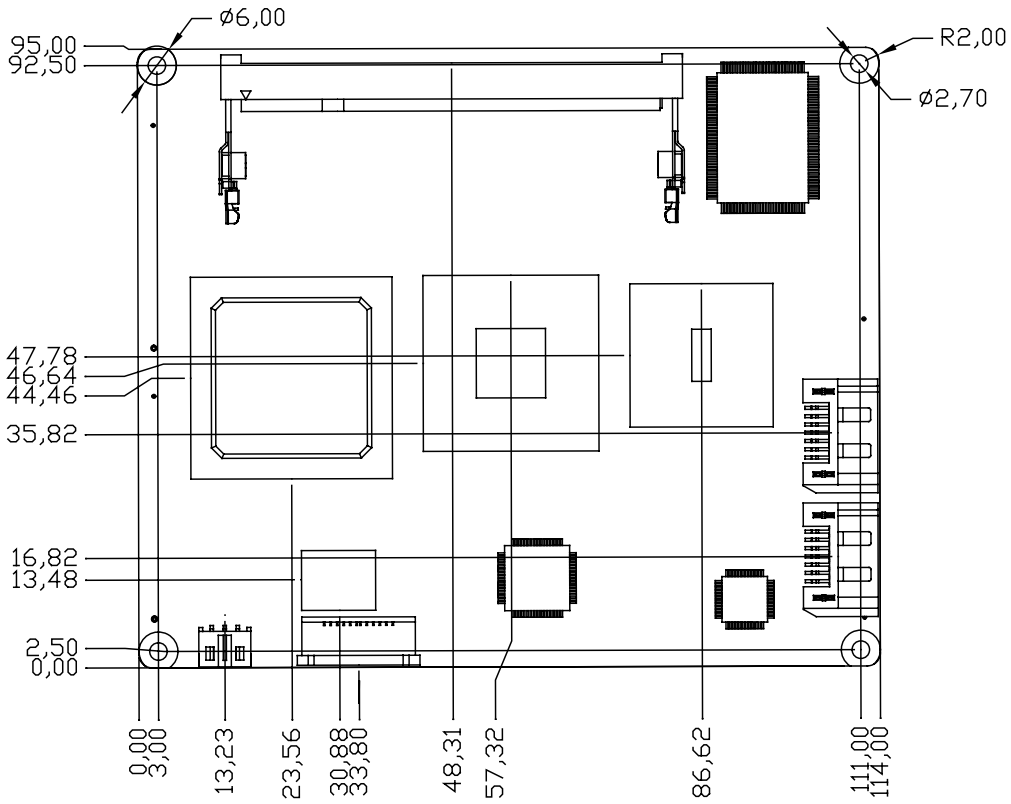


Figure 2.3 Board Layout (Component side)

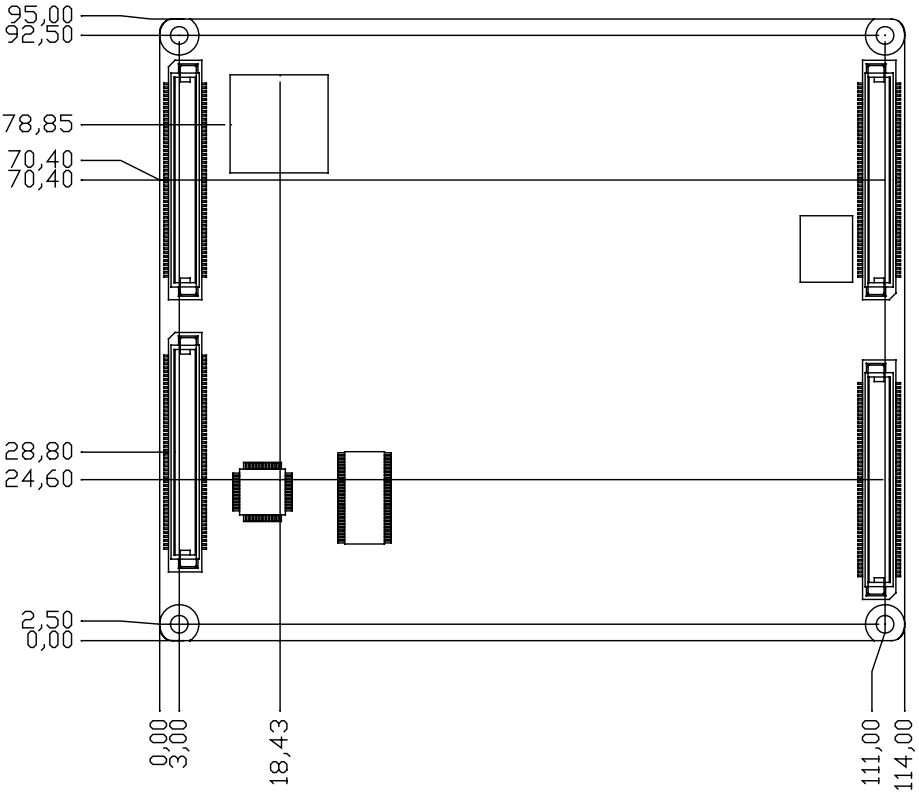


Figure 2.4 Board Layout (Solder side)

2.2.3 Heat spreader Dimensions (Unit: mm)

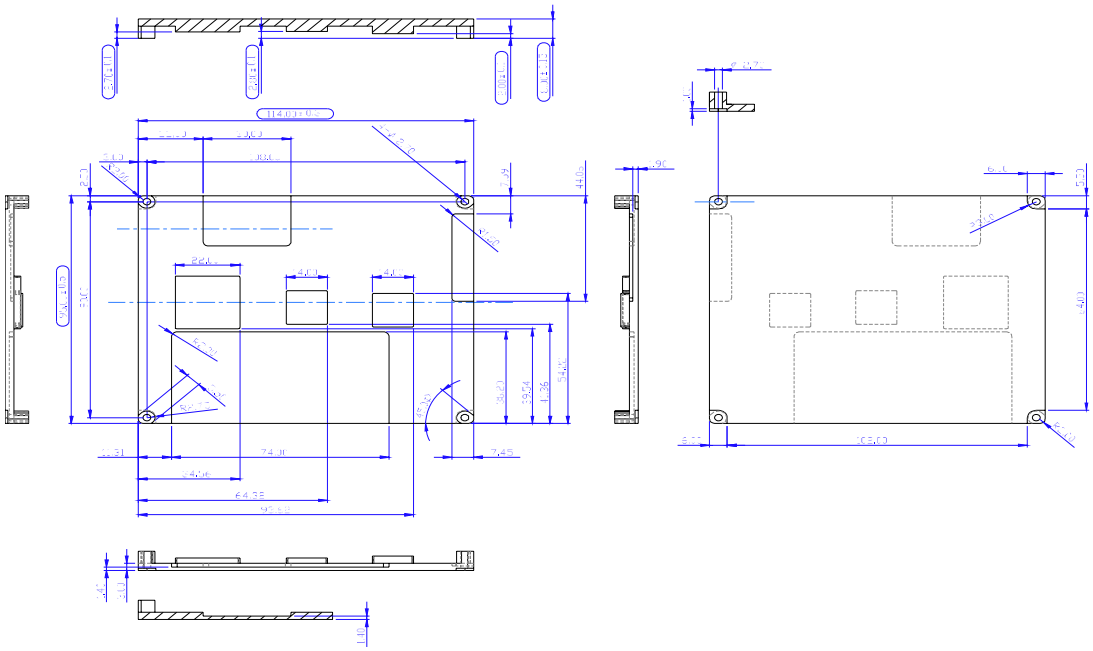


Figure 2.5 Drawing of Heatspreader for BGA type CPU

2.2.4 Thermal Solution

Important notice:

1. Please Note - the heat-spreader shipped with Advantech's SOM product is not a "COMPLETE" thermal solution. The function of this heat-spreader is for conducting heat from SOM module to the customer's own heat-sink or cooler which is added onto this heat-spreader.
2. An extra-efficient heat-sink or cooler is required to add onto this heat-spreader to ensure the SOM module can work appropriately.
3. An inefficient heat-sink or cooler may damage the SOM module. This kind of damage will invalidate the product warranty.
4. Advantech is able to provide optional heat-sinks or coolers for the SOM module, please contact your sales representative for details.
5. Please make sure the heat spreader temperature for the CPU module stays under 60° C.

For more information please refer to Advantech_ETX_DesignGuide, Chapter 8.

You can download Advantech_ETX_DesignGuide from http://com.advantech.com/

Chapter 3

BIOS settings

3.1 BIOS Introduction

AwardBIOS 6.0 is a full-featured BIOS provided by Advantech to deliver superior performance, compatibility, and functionality to industrial PCs and embedded boards. Its many options and extensions let you customize your products to a wide range of designs and target markets.

The modular, adaptable AwardBIOS 6.0 supports the broadest range of third-party peripherals and all popular chipsets, plus Intel, AMD, nVidia, VIA, and compatible CPUs from 386 through Pentium, AMD Geode, K7 and K8 (including multiple processor platforms), and VIA Eden C3 and C7 CPUs.

You can use Advantech's utilities to select and install features that suit your needs and your customers' needs.

3.2 BIOS Setup

The SOM-4461 system has AwardBIOS 6.0 built-in, which includes a CMOS SETUP utility that allows users to configure settings as required or to activate certain system features.

The CMOS SETUP saves configuration settings in the CMOS RAM of the motherboard. When the system power is turned off, the onboard battery supplies the necessary power to the CMOS RAM so that settings are retained.

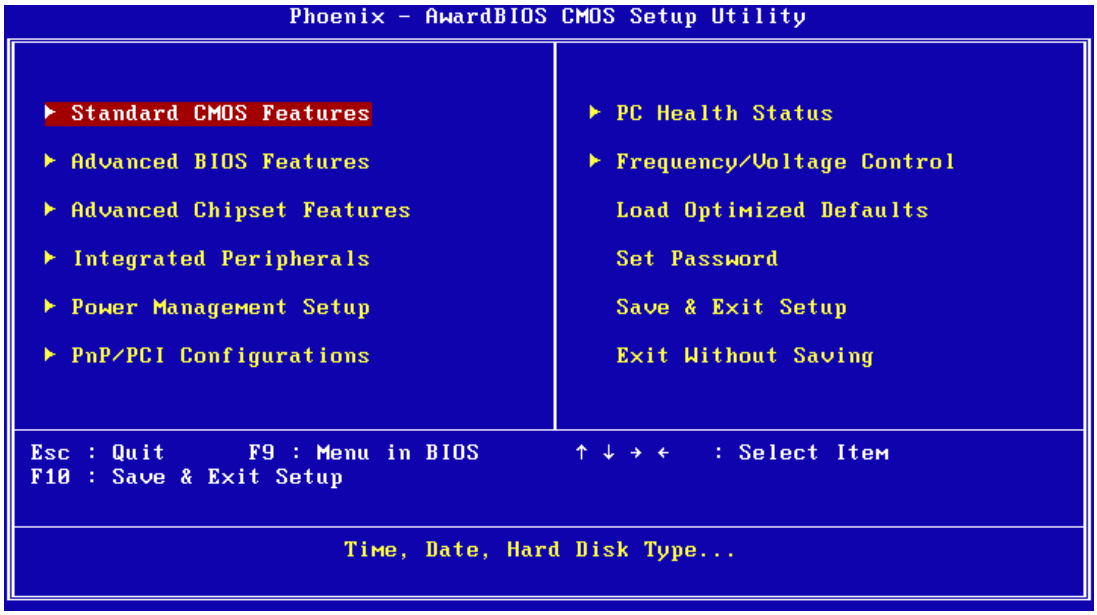
To access the CMOS SETUP screen, press the <Del> button during the power-on BIOS POST (Power-On Self Test).

CMOS SETUP Navigation and Control Keys:

< ↑ >< ↓ >< ← >< → >	Move to highlight item
<Enter>	Select Item
<Esc>	Main Menu - Start Quit sequence
	Sub Menu - Exit the current page and return to level above
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item Help
<F5>	Load Previous Values
<F7>	Load Optimized Defaults
<F10>	Save all CMOS changes

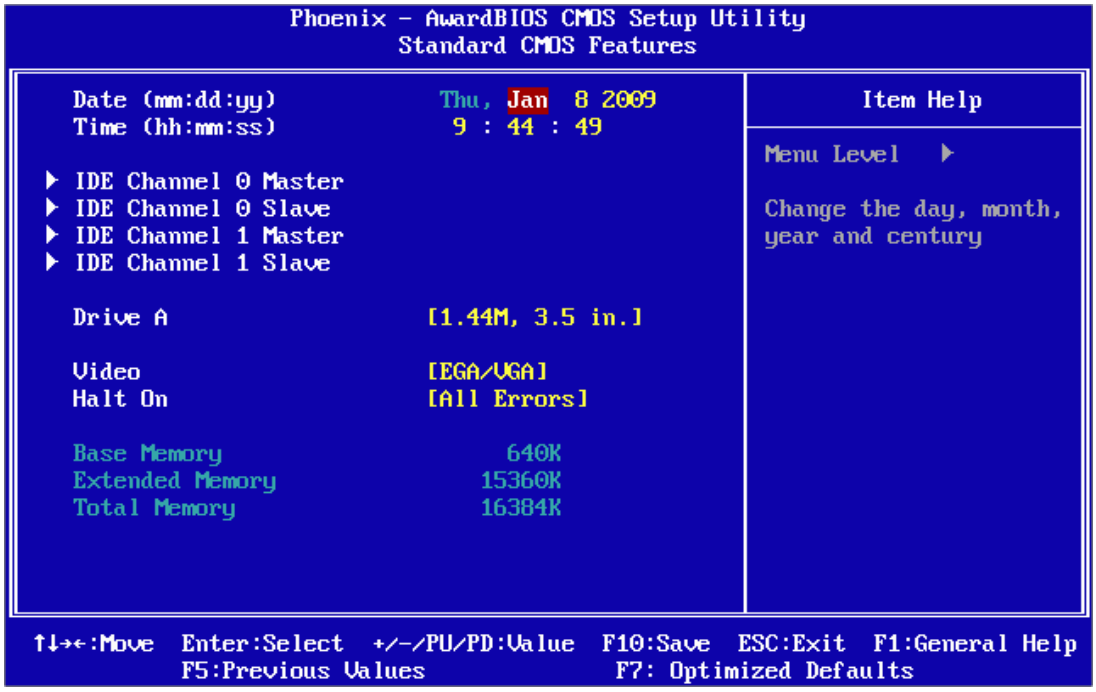
3.2.1 Main Menu

Press the <Del> key during startup to enter the BIOS CMOS Setup Utility; the Main Menu will appear on the screen. Use arrow keys to highlight the desired item, and press <Enter> to accept, or enter the sub-menu.


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherals
Power Management Setup
PnP/PCI Configurations
PC Health Status
Frequency/Voltage Control
Load Optimized Defaults
Set Password
Save & Exit Setup
Exit Without Saving
Esc : Quit F9 : Menu in BIOS ↑ ↓ → ← : Select Item
F10 : Save & Exit Setup
Time, Date, Hard Disk Type...

- **Standard CMOS Features**
  This setup page includes all the features for standard CMOS configuration.
- **Advanced BIOS Features**
  This setup page includes all the features for advanced BIOS configuration.
- **Advanced Chipset Features**
  This setup page includes all the features for advanced chipset configuration.
- **Integrated Peripherals**
  This setup page includes all onboard peripheral devices.
- **Power Management Setup**
  This setup page includes all the power management items.
- **PnP/PCI Configurations**
  This setup page includes PnP OS and PCI device configuration.
- **PC Health Status**
  This setup page includes the system auto-detect CPU and system temperature, voltage.
- **Frequency/Voltage Control**
  This setup page includes CPU host clock control.
- **Load Optimized Defaults**
  This selection loads optimized values for best system performance configuration.
- **Set Password**
  Establish, change or disable passwords.
- **Save & Exit Setup**
  Save CMOS value settings to CMOS and exit BIOS setup.
- **Exit Without Saving**
  Abandon all CMOS value changes and exit BIOS setup.

3.2.2 Standard CMOS Features


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Date (mm:dd:yy) Thu, Jan 8 2009
Time (hh:mm:ss) 9 : 44 : 49
IDE Channel 0 Master
IDE Channel 0 Slave
IDE Channel 1 Master
IDE Channel 1 Slave
Drive A [1.44M, 3.5 in.]
Video [EGA/VGA]
Halt On [All Errors]
Base Memory 640K
Extended Memory 15360K
Total Memory 16384K
Item Help
Menu Level
Change the day, month, year and century
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **Date**

  The date format is <weekday>, <month>, <day>, <year>.

Weekday	From Sun to Sat, determined and display by BIOS only
Month	From Jan to Dec.
Day	From 1 to 31
Year	From 1999 through 2098

- **Time**

  The time format in <hours>:<minutes>:<seconds>, based on the 24-hour time.

- **IDE Channel 0/1 Master/Slave**

  IDE HDD Auto-Detection - Press "Enter" for automatic device detection.

- **Drive A**

  The Item identifies the types of floppy disk drive A or drive B

None	No floppy drive installed
360K, 5.25"	5.25 inch PC-type standard drive; 360K byte capacity
1.2M, 5.25"	5.25 inch AT-type high-density drive; 1.2M byte capacity
720K, 3.5"	3.5 inch double-sided drive; 720K byte capacity
1.44M, 3.5"	3.5 inch double-sided drive; 1.44M byte capacity
2.88M, 3.5"	3.5 inch double-sided drive; 2.88M byte capacity

- **Halt on**

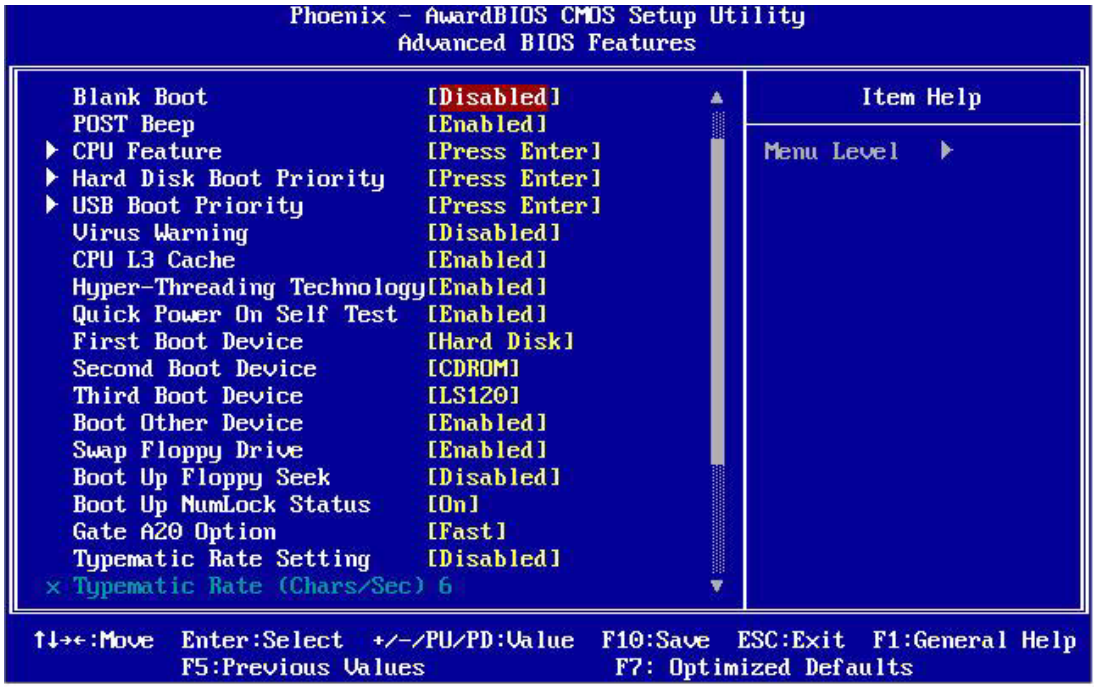
  This item determines whether the computer will stop if an error is detected during power up.

No Errors	The system boot process will not stop for any error
All Errors	Whenever the BIOS detects a non-fatal error the system boot process will be stopped.
All, But Keyboard	The system boot process will not stop for a keyboard error, but will stop for all other errors. (Default value)

All, But Diskette	The system boot process will not stop for a diskette error, but will stop for all other errors.
All, But Disk/Key	The system boot process will not stop for a keyboard or disk error, but will stop for all other errors.

- **Base Memory**
  Displays the amount of base (or conventional) memory installed in the system.
- **Extended Memory**
  Displays the amount of extended memory (above 1 MB in CPU's memory address map) installed in the system.
- **Total Memory**
  Displays the total system memory size.

3.2.3 Advanced BIOS Features


Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features
Blank Boot [Disabled]
POST Beep [Enabled]
CPU Feature [Press Enter]
Hard Disk Boot Priority [Press Enter]
USB Boot Priority [Press Enter]
Virus Warning [Disabled]
CPU L3 Cache [Enabled]
Hyper-Threading Technology [Enabled]
Quick Power On Self Test [Enabled]
First Boot Device [Hard Disk]
Second Boot Device [CDROM]
Third Boot Device [LS120]
Boot Other Device [Enabled]
Swap Floppy Drive [Enabled]
Boot Up Floppy Seek [Disabled]
Boot Up NumLock Status [On]
Gate A20 Option [Fast]
Typematic Rate Setting [Disabled]
x Typematic Rate (Chars/Sec) 6
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **Blank Boot [Disabled]**
  This item allows the user to enable/disable BIOS POST screen output.
- **POST Beep [Enabled]**
  This item allows the user to enable/disable POST beep sound.
- **CPU Feature**
  This item allows the user to adjust CPU settings such as CPU ratio, VID and Thermal, and special features like XD flag.
- **Hard Disk Boot Priority**
  This item allows the user to select the boot sequence for system devices such as HDD, SCSI, and RAID.
- **USB Boot Priority**
  This item allows the user to select the boot sequence for USB devices.
- **CPU L3 Cache [Enabled]**
  This item allows the user to enable/disable CPU L3 cache.

- **Hyper-Threading Technology [Enabled]**
  This item allows the user to enable/disable Hyper-threading support for the Intel® Pentium® 4 processor with HT Technology.
- **Quick Power On Self Test [Enabled]**
  This field speeds up the Power-On Self Test (POST) routine by skipping re-testing a second, third and fourth time. The default setting is enabled.
- **First / Second / Third / Other Boot Drive**

Hard Disk	Sets boot priority for the hard disk.
USB devices	Sets boot priority for USB devices.
CDROM	Sets boot priority for CDROM.
USB-FDD	Sets boot priority for USB-FDD.
USB-ZIP	Sets boot priority for USB-ZIP.
USB-CDROM	Sets boot priority for USB-CDROM.
LAN	Sets boot priority for LAN.
Disabled	Disables this boot function.

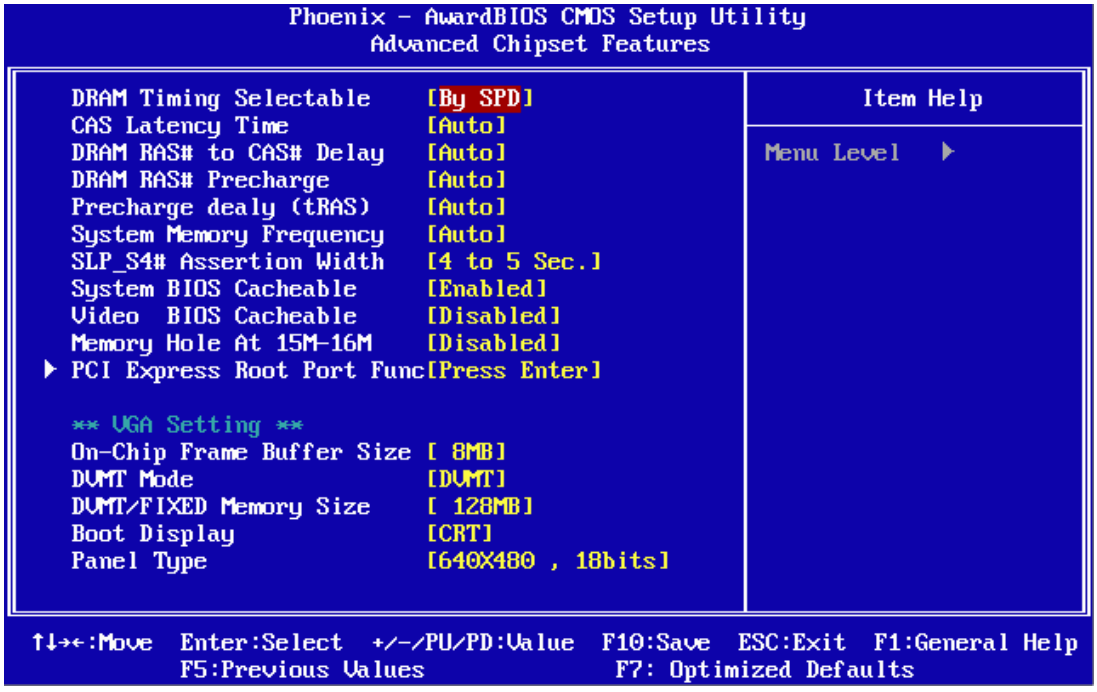
- **Boot Up NumLock Status [On]**
  This item allows the user to activate the Number Lock key at system boot.
- **Gate A20 Option [Fast]**
  This item allows the user to switch on or off A20 control by port 92.
- **Typematic Rate Setting**
  This item allows the user to set the two typematic control items.
  This field controls the speed of
  – Typematic Rate (Chars/Sec)
  This item controls the speed at which the system registers auto repeated keystrokes.
  The eight settings are: 6, 8, 10, 12, 15, 20, 24 and 30.
  – Typematic Delay (Msec)
  This item sets the key press delay time before auto repeat begins. The four delay rate options are: 250, 500, 750 and 1000.
- **Security Option [Setup]**

System	System requires correct password before booting, and also before permitting access to the Setup page.
Setup	System will boot, but requires correct password before permitting access to Setup. (Default value)

- **APIC Mode [Enabled]**
  This item allows the user to enable/disable the "Advanced Programmable Interrupt Controller". APIC is implemented in the motherboard and must be supported by the operating system; it extends the number of IRQs available.
- **MPS Version Control for OS [1.4]**
  This item sets the operating system multiprocessor support version.
- **OS Select For DRAM > 64 MB [Non-OS2]**
  Select OS2 only if the system is running the OS/2 operating system with greater than 64 MB of RAM on the system.
- **Full Screen LOGO Show [Enabled]**
  This item allows the user to set if the BIOS should show the full screen logo or not.

- **Summary Screen Show [Enabled]**
  This item allows the user to set if the BIOS should show the summary screen or not.

3.2.4 Advanced Chipset Features

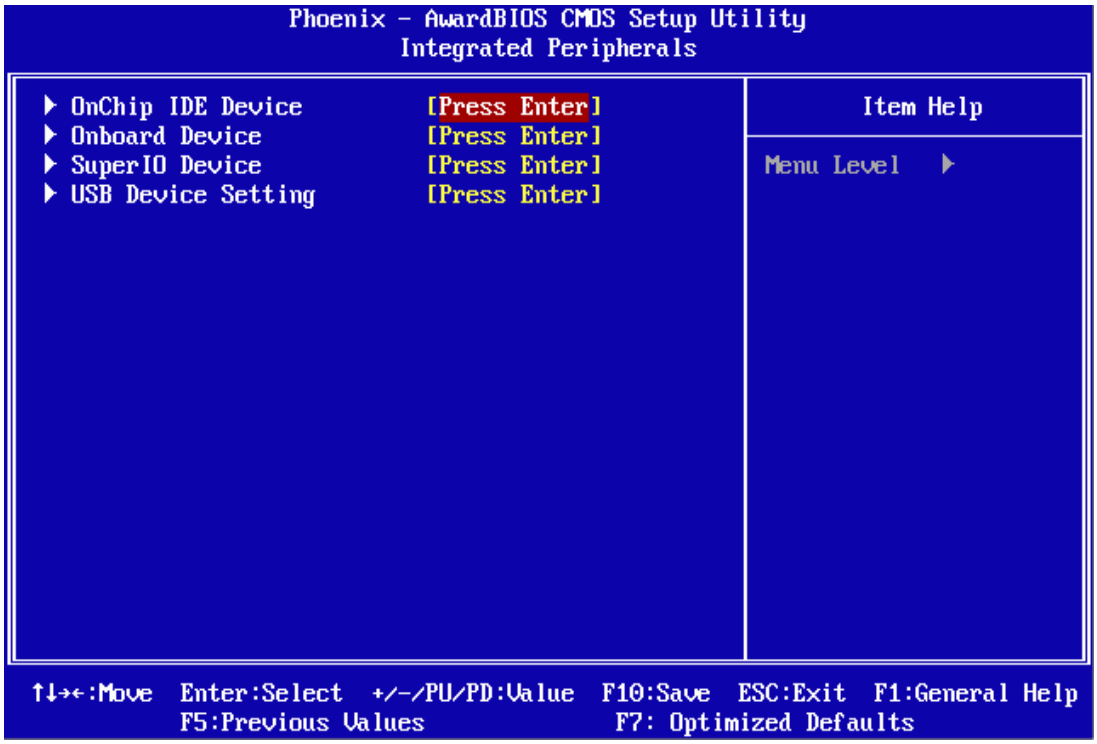

Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features
DRAM Timing Selectable [By SPD]
CAS Latency Time [Auto]
DRAM RAS# to CAS# Delay [Auto]
DRAM RAS# Precharge [Auto]
Precharge dealy (tRAS) [Auto]
System Memory Frequency [Auto]
SLP_S4# Assertion Width [4 to 5 Sec.]
System BIOS Cacheable [Enabled]
Video BIOS Cacheable [Disabled]
Memory Hole At 15M-16M [Disabled]
PCI Express Root Port Func [Press Enter]
** VGA Setting **
On-Chip Frame Buffer Size [8MB]
DVMT Mode [DVMT]
DVMT/FIXED Memory Size [128MB]
Boot Display [CRT]
Panel Type [640X480 , 18bits]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Advanced Chipset Features" screen controls the configuration of the board's chipset register settings and performance tuning - the options on this screen may vary depending on the chipset type. It is strongly recommended that only technical users make changes to the default settings.*

- **DRAM Timing Selectable [By SPD]**
  This item enables users to set the optimal timings for items 2 through 5. The system default setting of "By SPD" follows the SPD information and ensures the system running stable and at optimal performance.
- **CAS Latency Time [Auto]**
  This item enables users to set the timing delay in clock cycles before SDRAM starts a read command after receiving it.
- **DRAM RAS# to CAS# Delay [Auto]**
  This item enables users to set the timing of the transition from RAS (row address strobe) to CAS (column address strobe) as both rows and column are separately addressed shortly after DRAM is refreshed.
- **DRAM RAS# Precharge [Auto]**
  This item enables users to set the DRAM RAS# precharge timing, system default is setting to "Auto" to reference the data from SPD ROM.
- **Precharge delay (tRAS) [Auto]**
  This item allows user to adjust memory precharge time
- **System Memory Frequency [Auto]**
  This item allows the user to adjust memory frequency to improvement performance.

- **SLP_S4# Assertion Width [4 to 5 Sec]**
  This item allow the user to set the SLP_S4# Assertion Width.
- **System BIOS Cacheable [Enabled]**
  This item allows the system BIOS to be cached to allow faster execution and better performance.
- **Video BIOS Cacheable [Disabled]**
  This item allows the video BIOS to be cached to allow faster execution and better performance.
- **Memory Hole At 15M-16M [Disabled]**
  This item reserves 15MB-16MB memory address space to ISA expansion cards that specifically require the setting. Memory from 15MB-16MB will be unavailable to the system because of the expansion cards can only access memory at this area.
- **PCI Express Root Port Func [Press Enter]**
  This item allows the user to adjust the PCIE port to on, off, or auto.
- **On-Chip Frame Buffer Size [8MB]**
  This item allows the user to adjust on-chip graphics of memory buffer.
- **DVMT Mode [DVMT]**
  This item allows the user to adjust Intel's Dynamic Video Memory Technology (DVMT).Bios provide three option to choose (DVMT,FIXED and Both).
- **DVMT/FIXED Memory Size [128MB]**
  This item allows the user to adjust DVMT/FIXED graphics memory size.
- **Boot Display [CRT]**
  This item allows the user to decide which display mode to use for the boot display.
- **Panel Type [800 x 600, 18bits]**
  This item allows the user to adjust panel resolution.
- **LCD BackLight [High Active]**
  This item allows the user to adjust the polarity to enable LCD backlight.

3.2.5 Integrated Peripherals


Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals
OnChip IDE Device [Press Enter]
Onboard Device [Press Enter]
SuperIO Device [Press Enter]
USB Device Setting [Press Enter]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Integrated Peripherals" screen controls chipset configuration for IDE, ATA, SATA, USB, AC97, MC97 and Super IO and Sensor devices. The options on this screen vary depending on the chipset.*

- **OnChip IDE Device**

  This item enables users to set the OnChip IDE device status, including IDE devices and setting PIO and DMA access modes. Some chipsets support newer SATA devices (Serial-ATA).

- **Onboard Device**

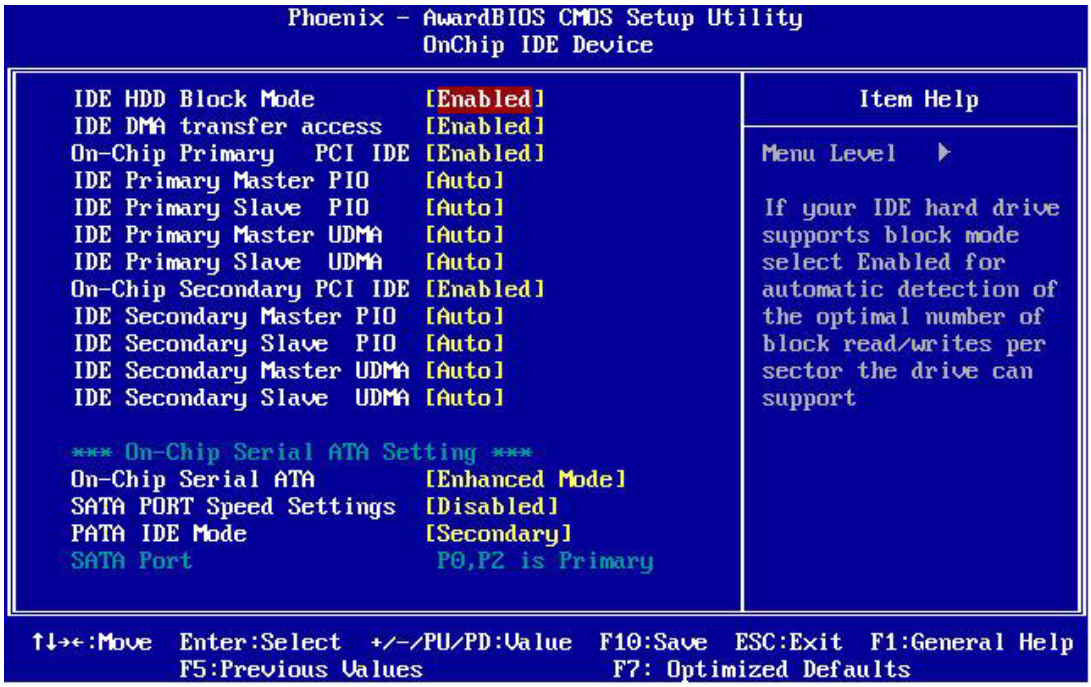
  This item enables users to set the Onboard device status, includes enable USB, AC97, MC97 and LAN devices.

- **Super IO Device**

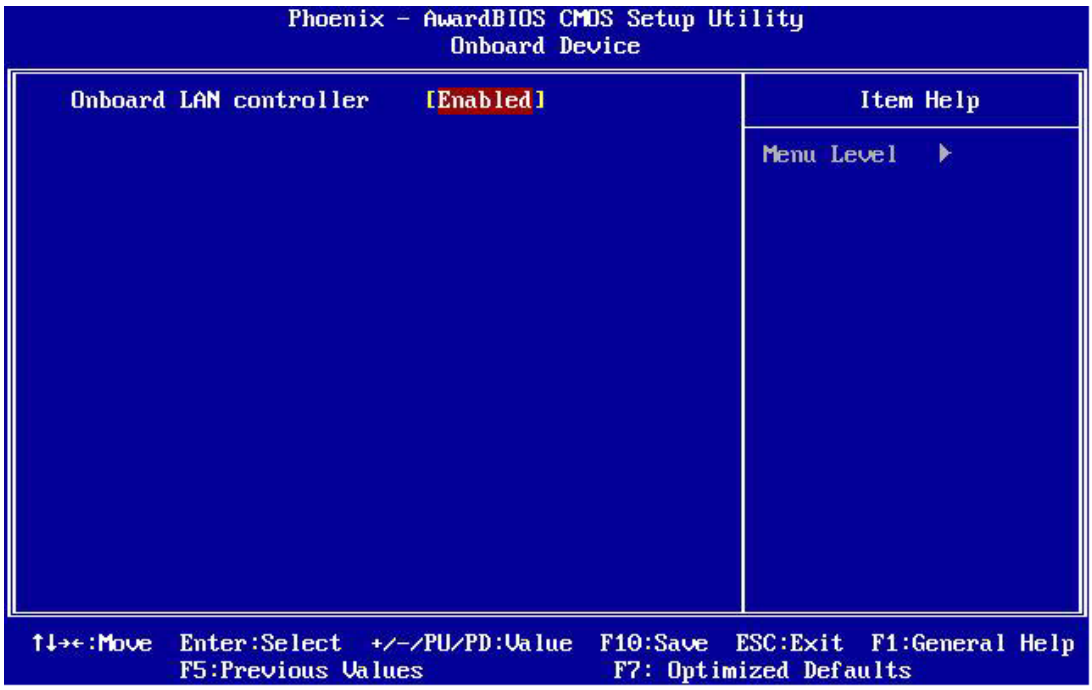
  This item enables users to set the Super IO device status, includes enable Floppy, COM, LPT and Power fail status.

- **USB Device Setting**

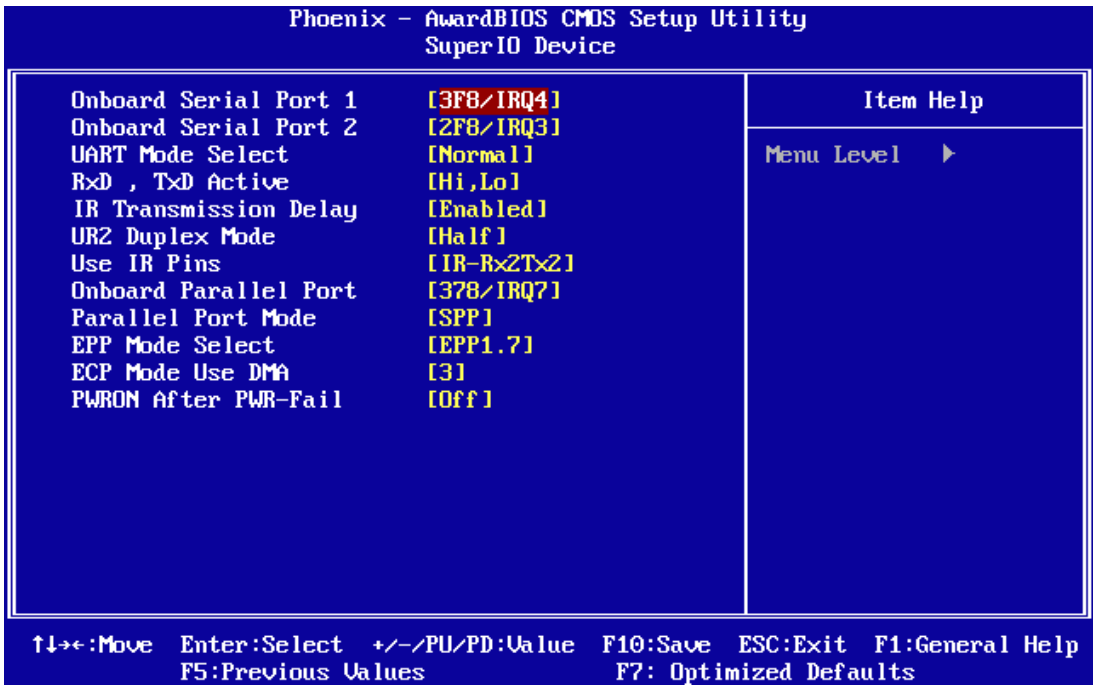
  This item enables users to set the USB device type.


Phoenix - AwardBIOS CMOS Setup Utility
OnChip IDE Device
IDE HDD Block Mode [Enabled]
IDE DMA transfer access [Enabled]
On-Chip Primary PCI IDE [Enabled]
IDE Primary Master PIO [Auto]
IDE Primary Slave PIO [Auto]
IDE Primary Master UDMA [Auto]
IDE Primary Slave UDMA [Auto]
On-Chip Secondary PCI IDE [Enabled]
IDE Secondary Master PIO [Auto]
IDE Secondary Slave PIO [Auto]
IDE Secondary Master UDMA [Auto]
IDE Secondary Slave UDMA [Auto]
*** On-Chip Serial ATA Setting ***
On-Chip Serial ATA [Enhanced Mode]
SATA PORT Speed Settings [Disabled]
PATA IDE Mode [Secondary]
SATA Port P0,P2 is Primary
Item Help
Menu Level
If your IDE hard drive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **IDE HDD Block Mode [Enabled]**
  This item allows the user to enable block mode for HDD.
- **IDE DMA transfer access [Enabled]**
  This item allows the user to enable block mode for DMA.
- **On-Chip Primary PCI IDE [Enabled]**
  This item allows the user to enable On-Chip IDE controller.
- **IDE HDD Primary Master/Slave PIO/UDMA [Auto]**
  This item allows the user to set PIO/UDMA mode for HDD.
- **On-Chip Secondary PCI IDE [Enabled]**
  This item allows the user to enable On-Chip IDE controller.
- **IDE HDD Secondary Master/Slave PIO/UDMA [Auto]**
  This item allows the user to set PIO/UDMA mode for HDD.
- **On-Chip Serial ATA [Enhanced Mode]**
  This item allows the user to set On-Chip serial ATA controller mode.
- **SATA Port Speed Settings [Disabled]**
  This item allows the user to manual set SATA port speed.
- **PATA IDE Mode [Secondary]**
  This item shows current PATA IDE mode.

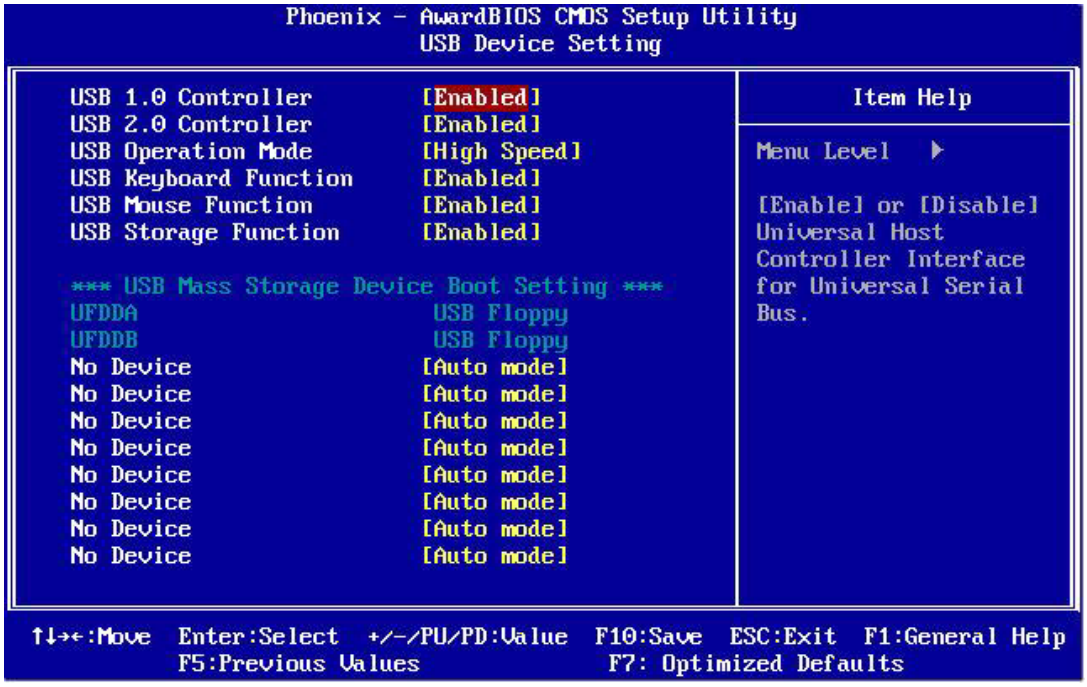

Phoenix - AwardBIOS CMOS Setup Utility
Onboard Device
Onboard LAN controller [Enabled]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **Onboard LAN Controller [Enabled]**
  This item allows the user to enable/disable Onboard LAN.


Phoenix - AwardBIOS CMOS Setup Utility
SuperIO Device
Onboard Serial Port 1 [3F8/IRQ4]
Onboard Serial Port 2 [2F8/IRQ3]
UART Mode Select [Normal]
RxD , TxD Active [Hi,Lo]
IR Transmission Delay [Enabled]
UR2 Duplex Mode [Half]
Use IR Pins [IR-Rx2Tx2]
Onboard Parallel Port [378/IRQ7]
Parallel Port Mode [SPP]
EPP Mode Select [EPP1.7]
ECP Mode Use DMA [3]
PWRON After PWR-Fail [Off]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **Onboard FDC Controller [Enabled]**
  This item allows the user to set FDC controller.
- **Onboard Serial port 2 [2F8/IRQ3]**
  This item allows the user to adjust serial port 2 address.
- **UART Mode Select [Normal]**
  This item allows the user to adjust UART mode. BIOS provide three item for choose (Normal, IrDA and ASKIR).

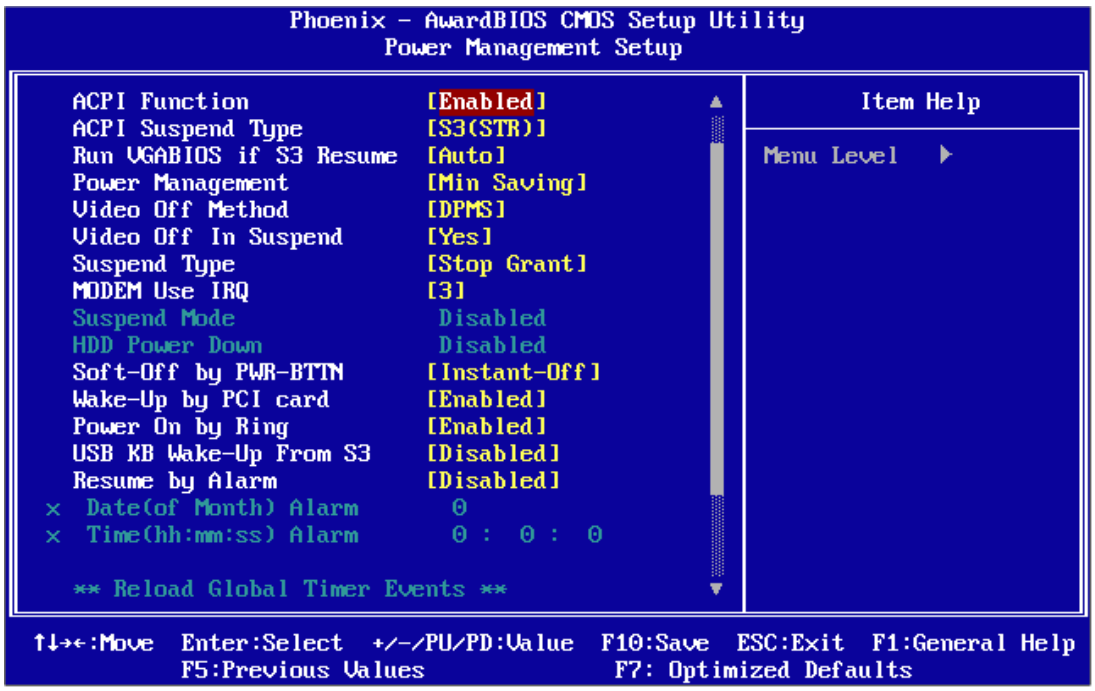
- **RxD, TxD Active [Hi,Lo]**
  This item allows the user to adjust infrared ray transition of polarity.
- **IR Transmission Delay [Enabled]**
  This item allows the user to adjust infrared ray transmission delay function.
- **UR2 Duplex mode [Half]**
  This item allows the user to adjust infrared ray duplex function. Two options are provided. (half, Full) Full-duplex mode permits simultaneous two-direction transmission. Half-duplex mode permits transmission in only one direction at a time.
- **Use IR Pins [IR-Rx2Tx2]**
  This item allows the user to adjust infrared ray pins of options.
- **Onboard Parallel Port [378/IRQ7]**
  This item allows the user to adjust parallel port address and IRQ.
- **Parallel Port Mode [SPP]**
  This item allows the user to adjust parallel port mode.
- **EPP Mode Select [EPP1.7]**
  This item allows the user to select EPP mode standard.
- **ECP Mode Use DMA [3]**
  This item allows the user to adjust the ECP DMA resource.
- **PWRON After PWR-Fail [Off]**
  This item allows the user to select recovery after power fail function; this function depends on the chipset.


Phoenix - AwardBIOS CMOS Setup Utility
USB Device Setting
USB 1.0 Controller [Enabled]
USB 2.0 Controller [Enabled]
USB Operation Mode [High Speed]
USB Keyboard Function [Enabled]
USB Mouse Function [Enabled]
USB Storage Function [Enabled]
*** USB Mass Storage Device Boot Setting ***
UFDDA USB Floppy
UFDDB USB Floppy
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
No Device [Auto mode]
Item Help
Menu Level ▶
[Enable] or [Disable] Universal Host Controller Interface for Universal Serial Bus.
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

- **USB 1.0 Controller [Enabled]**
  This item allows the user to enable/disable USB 1.0 Controller.
- **USB 2.0 Controller [Enabled]**
  This item allows the user to enable/disable USB 2.0 Controller.
- **USB Operation Mode [High Speed]**
  This item allows the user to adjust USB devices operate at High/Full/Low speed.
- **USB Keyboard Function [Enabled]**
  This item allows the user to enable/disable legacy support of USB Keyboard.

- **USB Mouse Function [Enabled]**
  This item allows the user to enable/disable legacy support of USB Mouse.
- **USB Storage Function [Enabled]**
  This item allows the user to enable/disable legacy support of USB Mass Storage
- **USB Mass Storage Device Boot Setting**
  This items list USB Mass Storage devices connected and allows the user to set Mass Storage type.

3.2.6 Power Management Setup


Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup
ACPI Function [Enabled]
ACPI Suspend Type [S3(STR)]
Run VGABIOS if S3 Resume [Auto]
Power Management [Min Saving]
Video Off Method [DPMS]
Video Off In Suspend [Yes]
Suspend Type [Stop Grant]
MODEM Use IRQ [3]
Suspend Mode Disabled
HDD Power Down Disabled
Soft-Off by PWR-BTTN [Instant-Off]
Wake-Up by PCI card [Enabled]
Power On by Ring [Enabled]
USB KB Wake-Up From S3 [Disabled]
Resume by Alarm [Disabled]
x Date(of Month) Alarm 0
x Time(hh:mm:ss) Alarm 0 : 0 : 0
** Reload Global Timer Events **
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Power Management Setup" screen allows configuration of the system for effective energy savings while still operating in a manner consistent with intended computer use.*

- **ACPI Function [Enabled]**
  This item defines the ACPI (Advanced Configuration and Power Management) feature that makes hardware status information available to the operating system, and communicate PC and system devices for improving the power management.
- **ACPI Suspend Type [S3 (STR)]**
  This item allows the user to select sleep state, the state when the computer is in suspend mode.

S1 (POS)	The suspend mode is equivalent to a software power down.
S3 (STR)	The system shuts down with the exception of a refresh current to the system memory.

- **Run VGABIOS if S3 Resume° [Auto[**
  This item allows the user to enable run VGA BIOS if system resume from S3.

- **Power Management [Min Saving]**
  This item allows the user to select system power saving mode.

Min Saving	Minimum power management. Suspend Mode=1 hr.
Max Saving	Maximum power management. Suspend Mode=1 min.
User Defined	Allows the user to set each mode individually. Suspend Mode= Disabled or 1 min ~1 hr.

- **Video Off Method [DPMS]**
  This item allows the user to determine the manner in which the monitor is blanked.

V/H SYNC+Blank	This option will cause the system to turn off vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

- **Video Off In Suspend [Yes]**
  This item allows the user to turn off video during system enter suspend mode.
- **Suspend Type [Stop Grant]**
  This item allows the user to determine the suspend type.
- **Modem use IRQ [3]**
  This item allows the user to determine the IRQ which the MODEM can use.
- **Suspend Mode [1 Hour]**
  This item allows the user to determine the time of system inactivity, all devices except the CPU will be shut off.
- **HDD Power Down Mode [15 Min]**
  This item allows the user to determine the time of system inactivity, the hard disk drive will be powered down.
- **Soft-Off by PWR-BTTN [Instant-Off]**
  This item allows the user to define the power button functions.

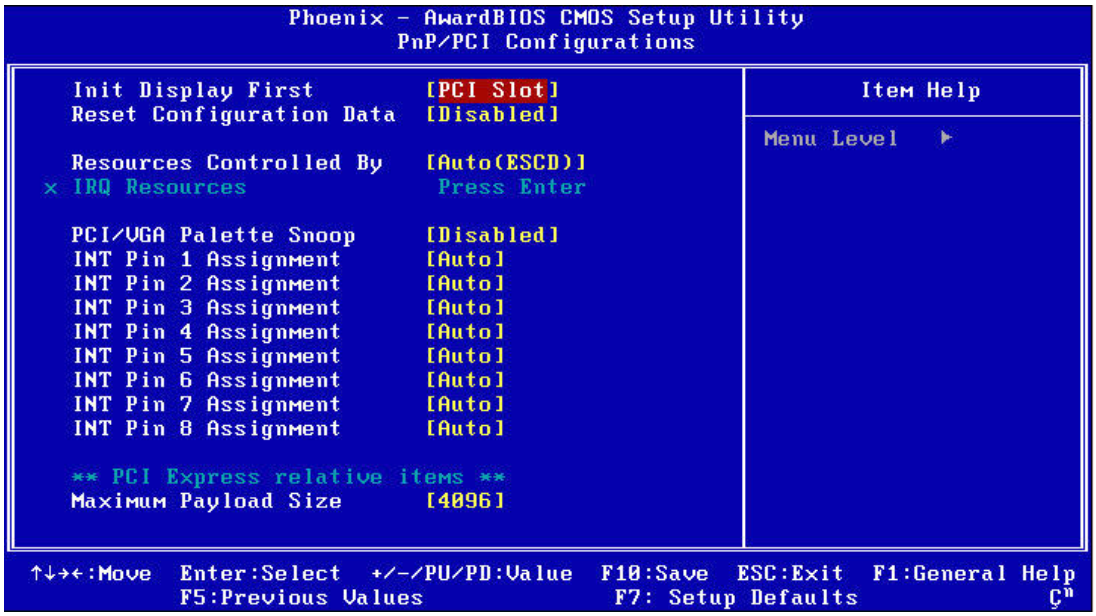
Instant-Off	Press the power button to power off instantly.
Delay 4 Sec	Press and hold the power button for 4 secs to power off.

- **Wake-Up by PCI card [Enabled]**
  This item allows the user to enable and define how PCI cards wake the system up from suspend mode
- **Power On by Ring [Enabled]**
  This item allows the user to define the system will resume by activating of modem ring.
- **USB KB Wake-Up From S3 [Disabled]**
  This item allows the user to enable and define how the system will wakeup by activation of the USB keyboard in S3 mode.
- **Resume by Alarm [Disabled]**
  This item allows the user to enable and key in Date/time to power on system.

Disabled	Disable this function.
Enabled	Enable alarm function to power on system
Day (of month) Alarm	1-31
Time (HH:MM:SS) Alarm	(0-23) : (0-59) : 0-59)

- **Reload Global Timer Events**
  This item allows the user to select the events to reload global timer for legacy power management.

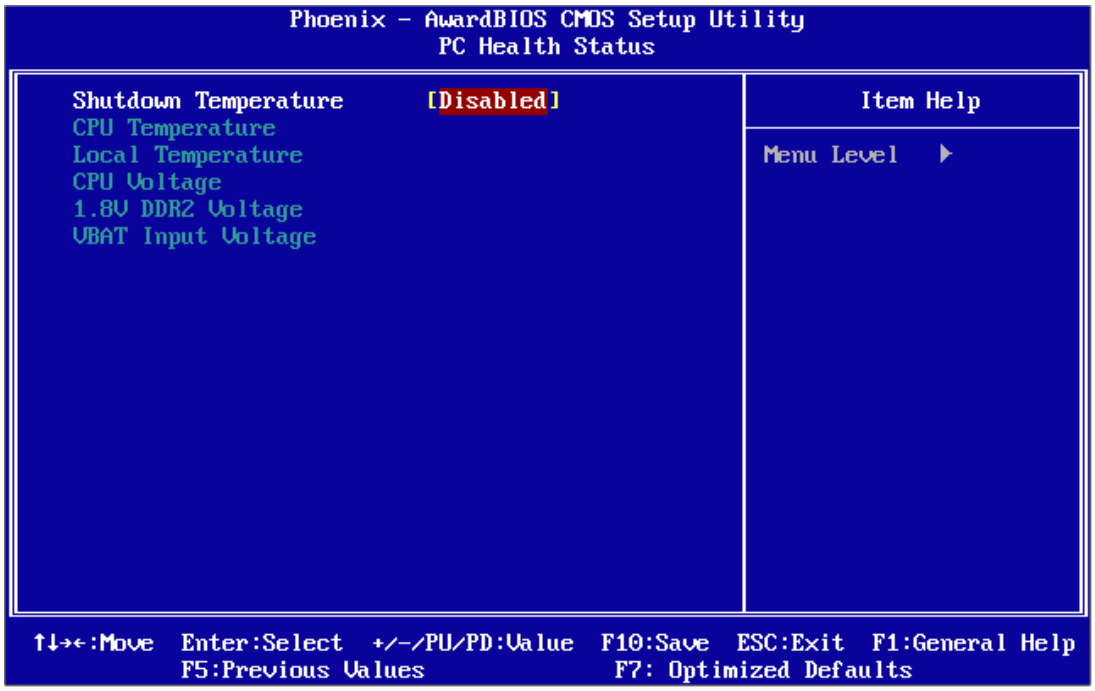
3.2.7 PnP/PCI Configurations


Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations
Init Display First [PCI Slot]
Reset Configuration Data [Disabled]
Resources Controlled By [Auto(ESCD)]
x IRQ Resources Press Enter
PCI/VGA Palette Snoop [Disabled]
INT Pin 1 Assignment [Auto]
INT Pin 2 Assignment [Auto]
INT Pin 3 Assignment [Auto]
INT Pin 4 Assignment [Auto]
INT Pin 5 Assignment [Auto]
INT Pin 6 Assignment [Auto]
INT Pin 7 Assignment [Auto]
INT Pin 8 Assignment [Auto]
** PCI Express relative items **
Maximum Payload Size [4096]
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Setup Defaults

Note! *This "PnP/PCI Configurations" option sets up the IRQ and DMA (both PnP and PCI bus assignments).*

- **Init Display First [PCI Slot]**
  This item is setting for start up video output from PCI or Onboard device.
- **Reset Configuration Data [Disabled]**
  This item allow the user to clear any PnP configuration data stored in the BIOS.
- **Resources Controlled By [Auto (ESCD)]**
  - **IRQ Resources**
    This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11, 12, 14, and 15.
  - **DMA Resources**
    This item allows you respectively assign an interruptive type for DMA, 0, 1, 2, 3, 4, 5, 6, and 7.
- **PCI VGA Palette Snoop [Disabled]**
  The item is designed to solve problems caused by some non-standard VGA cards. A built-in VGA system does not need this function.
- **INT Pin 1~8 Assignment [Auto]**
  This item allows the user to select the interrupt request (IRQ) assigned to a device connected to the PCI interface on your system.
- **Maximum Payload Size [4096]**
  This item allows the user to adjust maximum TLP (Transaction Layer Packet) payload size.

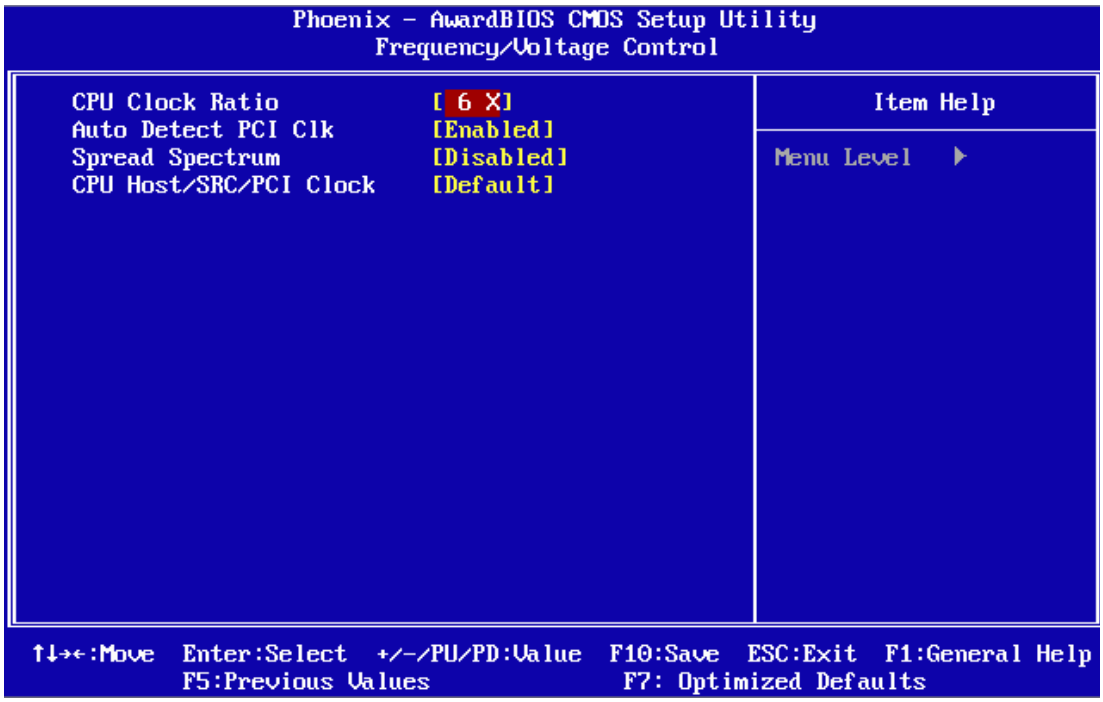
3.2.8 PC Health Status



Note! *The "PC Health Status" screen controls the display of thermal, fan, and voltage status of the board. The options on this page vary depending on the chipset.*

- **Shutdown Temperature [Disabled]**
  This item allows the user to set the temperature to notify the ACPI OS to shut-down the system.
- **Current System Temp. [Show Only]**
  This item displays current board temperature.
- **Current CPU1 Temperature [Show Only]**
  This item displays current CPU temperature.
- **CPU VCore/+5V/+5VSB/+1.5V/1.8 V [Show Only]**
  This item displays current CPU and system voltage.

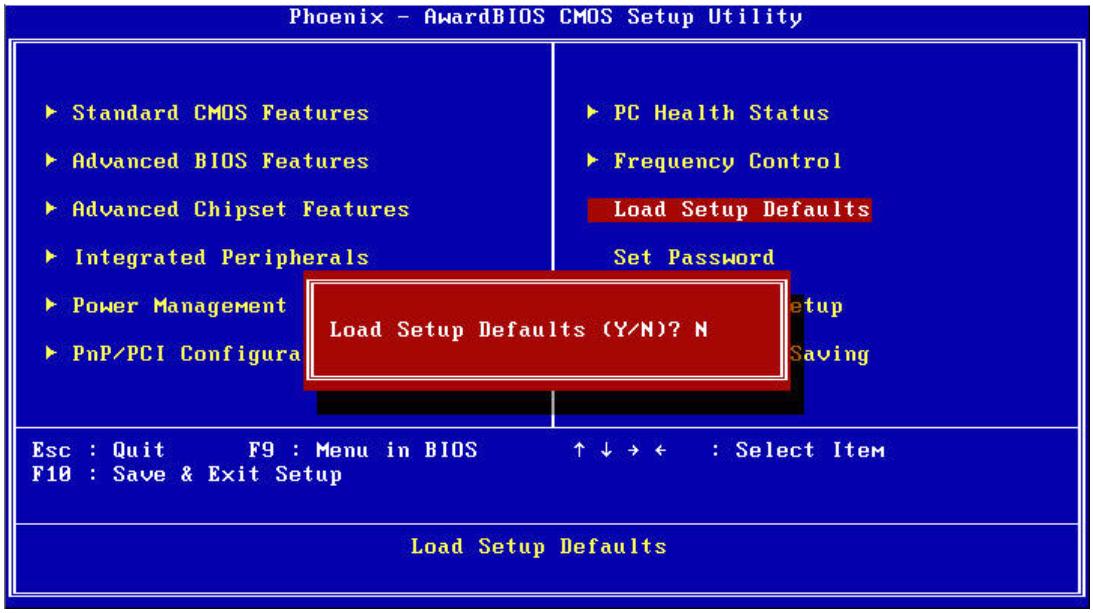
3.2.9 Frequency/Voltage Control


Phoenix - AwardBIOS CMOS Setup Utility
Frequency/Voltage Control
CPU Clock Ratio [6 X]
Auto Detect PCI Clk [Enabled]
Spread Spectrum [Disabled]
CPU Host/SRC/PCI Clock [Default]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5:Previous Values F7: Optimized Defaults

Note! *The "Frequency/Voltage Control" screen controls the CPU host and PCI frequency. The options on this page vary depending on the chipset; items show up according to installed CPU capacities.*

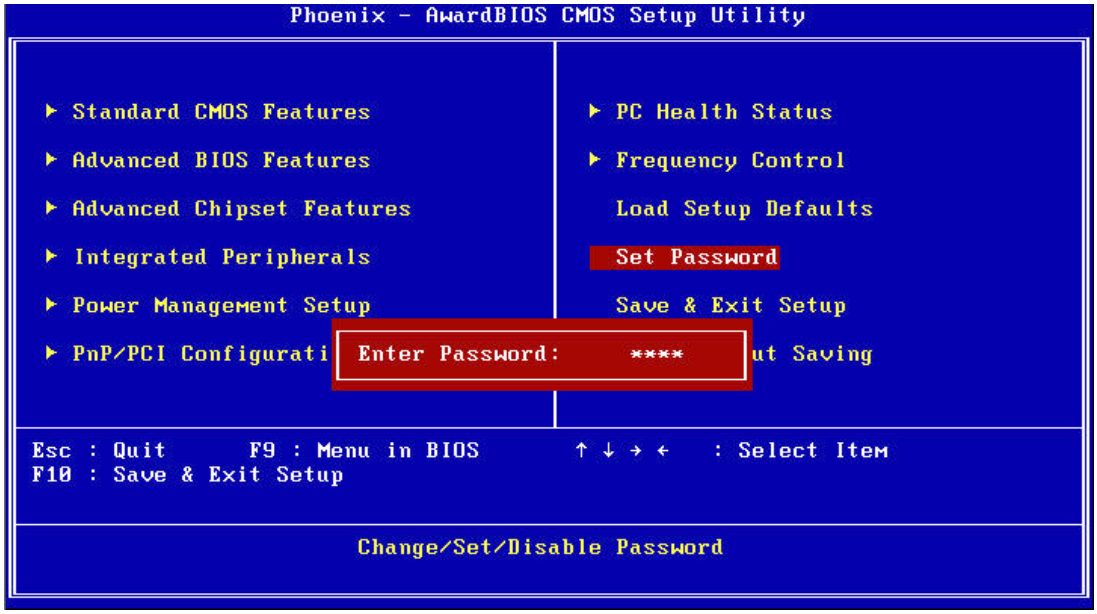
- **CPU Clock Ratio [6X]**
  This item enables users to set the CPU clock ratio manually.
- **Auto Detect PCI Clk [Enabled]**
  This item enables users to set the PCI Clk either by automatic system detection or manually.
- **Spread Spectrum [Disabled]**
  This item enables users to set the spread spectrum modulation.
- **CPU Host/SRC/PCI Clock [Defautl]**
  This item enables users to set the CPUhost/SRC/PCI clock.

3.2.10 Load Optimized Defaults


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherals
Power Management
PnP/PCI Configura
PC Health Status
Frequency Control
Load Setup Defaults
Set Password
Load Setup Defaults (Y/N)? N
Esc : Quit F9 : Menu in BIOS ↑ ↓ → ← : Select Item
F10 : Save & Exit Setup
Load Setup Defaults

Note! *"Load Optimized Defaults" loads the default system values directly from ROM. If the stored record created by the setup program should ever become corrupted (and therefore unusable), select Load Setup Defaults to have these default values load automatically for the next bootup.*

3.2.11 Set Password



Note! *To enable this feature, you should first go to the "Advanced BIOS Features" menu, choose the Security Option, and select either System or Setup, depending on which aspects you want password protected. System requires a password both to boot the system and to enter Setup. Setup requires a password only to enter Setup. A password may be at most 8 characters long.*

To Establish Password

1. Choose the **Set Password** option from the **CMOS Setup Utility** Main Menu and press <Enter>.
2. When you see **Enter Password**, enter the desired password and press <Enter>.
3. At the **Confirm Password** prompt, retype the desired password, then press <Enter>.
4. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

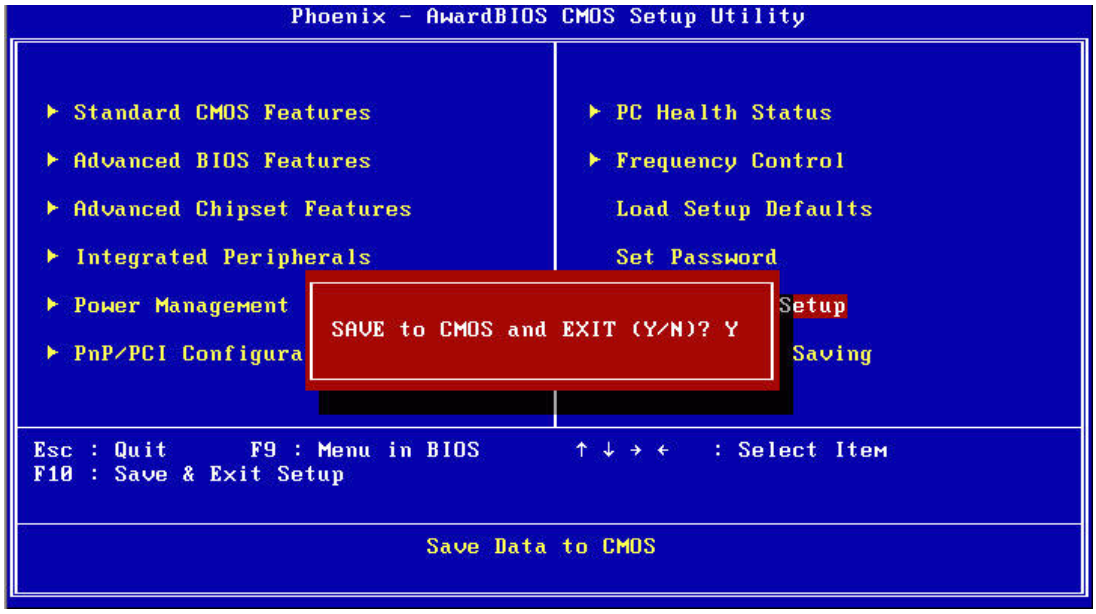
To Change Password

1. Choose the **Set Password** option from the **CMOS Setup Utility** main menu and press <Enter>.
2. When you see **Enter Password**, enter the existing password and press <Enter>.
3. You will see the **Confirm Password** prompt, type it in again, and press <Enter>.
4. Select **Set Password** again, and at the **Enter Password** prompt, enter the new password and press <Enter>.
5. At the **Confirm Password** prompt, retype the new password, and press <Enter>.
6. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

To Disable a Password

1. Choose the **Set Password** option from the **CMOS Setup Utility** main menu and press <Enter>.
2. When you see the **Enter Password** prompt, enter the existing password and press <Enter>.
3. You will see **Confirm Password**, type it in again, and press <Enter>.
4. Select **Set Password** again, and at the **Enter Password** prompt, DO NOT enter anything - just press <Enter>.
5. At the **Confirm Password** prompt, again, DO NOT type in anything - just press <Enter>.
6. Select **Save to CMOS** and exit, type <Y>, then <Enter>.

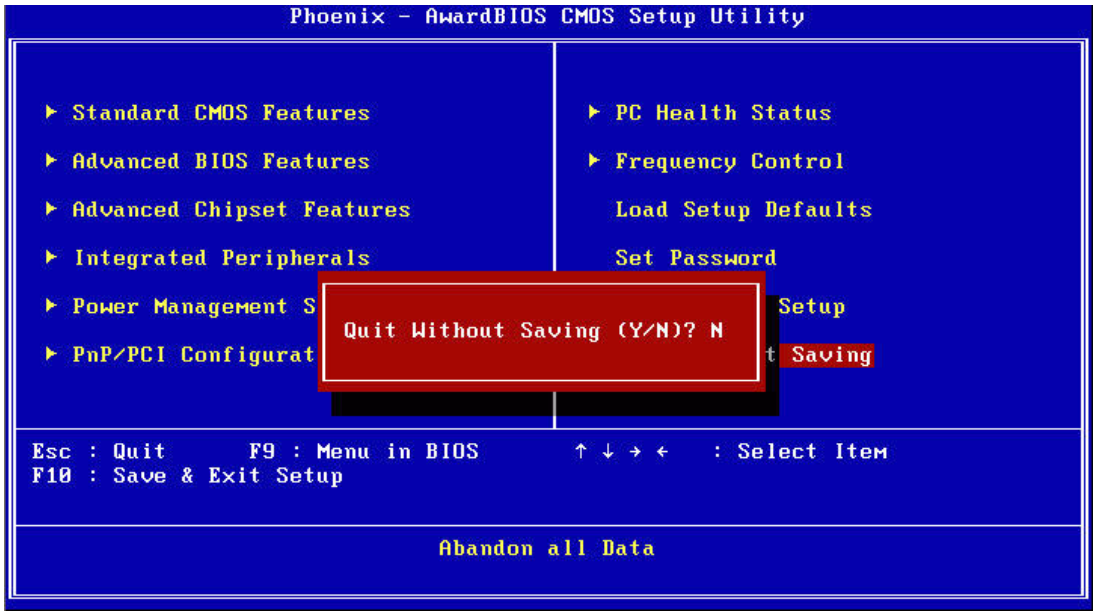
3.2.12 Save & Exit Setup



Note! *Typing "Y" will quit the BIOS Setup Utility and save user setup values to CMOS.*

Typing "N" will return to BIOS Setup Utility.

3.2.13 Quit Without Saving



Note! *Typing "Y" will quit the BIOS Setup Utility without saving any changes to CMOS.*

Typing "N" will return to the BIOS Setup Utility.

Chapter 4

S/W Introduction & Installation

4.1 S/W Introduction

Advantech "COM" (Computer On Module) series is backwardly compatible with existing hardware and software systems. They are fully scalable for upgrades or changing application needs and feature long life support so important to embedded developers. Advantech's own SUSI (Secure and Unified Smart Interface) API library speeds software development, and global logistics and support streamline the product development process.

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows® embedded technology." We enable Windows® Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows® Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured.

4.2.1 Windows XP professional

To install the drivers please just insert the CD into CD-ROM, select the drivers that you want to install, then run .exe (set up) file under each chipset folder and follow Driver Setup instructions to complete the installation.

4.2.2 Other OS

To install the drivers for Other Windows OS or Linux, please browse the CD to run the setup file under each chipset folder on the CD-ROM.

Appendix A

Watchdog Timer

This appendix gives you information about the watchdog timer programming on the SOM-4461 CPU System on Module

Sections include:

- Watchdog Timer Programming

A.1 Programming the Watchdog Timer

Below is a sample of programming code in Turbo C++ for controlling the Watchdog Timer function.

```
#include <stdio.h>
#include <stdlib.h>
#include <dos.h>

int main(int argc, char* argv[])
{
   long reboot_counter;

   if (argc != 2) {
      printf("Parameter Number is Wrong!!\n");
      exit(0);
   }

   reboot_counter = atol(argv[1]);

   StartWdtW836272E_DHG(reboot_counter);

   return 0;
}

void StartWdtW836272E_DHG (long SpecTime)
{
            unsigned char temp;

            outportb( 0x2E, 0x87 );
            outportb( 0x2E, 0x87 );
            outportb( 0x2E, 0x07 );
            outportb( 0x2F, 0x08 );
            outportb( 0x2E, 0x2D );
            temp = inportb( 0x2F );
            temp = temp & 0xFE;  // Mask bit0
            outportb( 0x2F, temp );
            outportb( 0x2E, 0x30 );
            outportb( 0x2F, 0x01 );
            outportb( 0x2E, 0xF5 );
            outportb( 0x2F, 0x00 );
            outportb( 0x2E, 0xF6 );
            outportb( 0x2F, SpecTime );
            outportb( 0x2E, 0xAA );
}
```

Appendix B

System Assignments

This appendix gives you the information about the system resource allocations on the SOM-4461 CPU System on Module

Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- System Memory Map

B.1 System I/O Ports

Table B.1: System I/O Ports

Resource	Device
0x00000000-0x00000CF7	PCI bus
0x00000000-0x00000CF7	Direct memory access controller
0x00000D00-0x0000FFFF	PCI bus
0x0000FF00-0x0000FF07	Mobile Intel(R) 945 Express Chipset Family
0x000003B0-0x000003BB	Mobile Intel(R) 945 Express Chipset Family
0x000003C0-0x000003DF	Mobile Intel(R) 945 Express Chipset Family
0x0000C000-0x0000CFFF	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
0x0000CE00-0x0000CEFF	Realtek PCIe FE Family Controller #2
0x0000FE00-0x0000FE1F	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
0x0000FD00-0x0000FD1F	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
0x0000FC00-0x0000FC1F	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
0x0000FB00-0x0000FB1F	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
0x0000F000-0x0000F0FF	Realtek AC'97 Audio
0x0000FA00-0x0000FA3F	Realtek AC'97 Audio
0x00000279-0x00000279	ISAPNP Read Data Port
0x00000274-0x00000277	ISAPNP Read Data Port
0x00000010-0x0000001F	Motherboard resources
0x00000022-0x0000003F	Motherboard resources
0x00000044-0x0000005F	Motherboard resources
0x00000062-0x00000063	Motherboard resources
0x00000065-0x0000006F	Motherboard resources
0x00000074-0x0000007F	Motherboard resources
0x00000091-0x00000093	Motherboard resources
0x000000A2-0x000000BF	Motherboard resources
0x000000E0-0x000000EF	Motherboard resources
0x00000B78-0x00000B7B	Motherboard resources
0x00000F78-0x00000F7B	Motherboard resources
0x00000A78-0x00000A7B	Motherboard resources
0x00000E78-0x00000E7B	Motherboard resources
0x00000BBC-0x00000BBF	Motherboard resources
0x00000FBC-0x00000FBF	Motherboard resources
0x000004D0-0x000004D1	Motherboard resources
0x00000294-0x00000297	Motherboard resources
0x00000880-0x0000088F	Motherboard resources
0x00000020-0x00000021	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x00000080-0x00000090	Direct memory access controller
0x00000094-0x0000009F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller
0x00000040-0x00000043	System timer

Table B.1: System I/O Ports	
0x00000070-0x00000073	System CMOS/real time clock
0x00000061-0x00000061	System speaker
0x000000F0-0x000000FF	Numeric data processor
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00000378-0x0000037F	Printer Port (LPT1)
0x00000778-0x0000077B	Printer Port (LPT1)
0x00000060-0x00000060	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0x00000064-0x00000064	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000400-0x000004BF	Motherboard resources
0x0000F800-0x0000F80F	Intel(R) 82801G (ICH7 Family) Ultra ATA Storage Controllers - 27DF
0x000001F0-0x000001F7	Primary IDE Channel
0x000003F6-0x000003F6	Primary IDE Channel
0x0000F700-0x0000F707	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0x0000F600-0x0000F603	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0x0000F500-0x0000F507	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0x0000F400-0x0000F403	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0x0000F300-0x0000F30F	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0x00000500-0x0000051F	Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA

B.2 DMA Channel Assignments

Table B.2: DMA Channel Assignments	
Resource	**Device**
Channel 4	Direct memory access controller

Note! *SOM-4461 supports DMA function by request.*

B.3 Interrupt Assignments

Table B.3: Interrupt Assignments

Resource	Device
IRQ 0	System timer
IRQ 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Communications Port (COM4)
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Communications Port (COM3)
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Numeric data processor
IRQ 14	Primary IDE Channel
IRQ 15	Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA
IRQ 16	Mobile Intel(R) 945 Express Chipset Family
IRQ 16	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
IRQ 16	Realtek PCIe FE Family Controller #2
IRQ 16	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
IRQ 17	Realtek AC'97 Audio
IRQ 18	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
IRQ 19	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
IRQ 19	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
IRQ 23	Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
IRQ 23	Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC

B.4 System Memory Map

Table B.4: System Memory Map

Resource	Device
0xA0000-0xBFFFF	PCI bus
0xA0000-0xBFFFF	Mobile Intel(R) 945 Express Chipset Family
0xC0000-0xDFFFF	PCI bus
0x3F700000-0xFEBFFFFF	PCI bus
0xFDF00000-0xFDF7FFFF	Mobile Intel(R) 945 Express Chipset Family
0xD0000000-0xDFFFFFFF	Mobile Intel(R) 945 Express Chipset Family
0xFDF80000-0xFDFBFFFF	Mobile Intel(R) 945 Express Chipset Family
0xFEB80000-0xFEBFFFFF	Mobile Intel(R) 945 Express Chipset Family
0xFDB00000-0xFDBFFFFF	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
0xFDC00000-0xFDCFFFFF	Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
0xFDBFF000-0xFDBFFFFF	Realtek PCIe FE Family Controller #2
0xFDCF0000-0xFDCFFFFF	Realtek PCIe FE Family Controller #2
0xFDFFF000-0xFDFFF3FF	Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
0xFDFFE000-0xFDFFE1FF	Realtek AC'97 Audio
0xFDFFD000-0xFDFFD0FF	Realtek AC'97 Audio
0xFFB80000-0xFFBFFFFF	Intel(R) 82802 Firmware Hub Device
0xFDFFC000-0xFDFFC3FF	Intel(R) 82801GBM/GHM (ICH7-M Family) Serial ATA Storage Controller - 27C4
0xE0000000-0xEFFFFFFF	Motherboard resources
0xF0000-0xFFFFF	System board
0x3F6E0000-0x3F6FFFFF	System board
0x0000-0x9FFFF	System board
0x100000-0x3F6DFFFF	System board
0xFEC00000-0xFEC00FFF	System board
0xFED13000-0xFED1DFFF	System board
0xFED20000-0xFED8FFFF	System board
0xFEE00000-0xFEE00FFF	System board
0xFFB00000-0xFFB7FFFF	System board
0xFFF00000-0xFFFFFFFF	System board
0xE0000-0xEFFFF	System board

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